

MOSQUITOES AS FLOWER VISITORS.

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In discussions of the feeding habits of mosquitoes one often finds the statement that mosquitoes suck the juices of plants and visit flowers to obtain honey. Generally, however, no details are given that would convince one that these statements are based upon actual observation. During the past season I found a species of mosquito frequenting flowers in large numbers. It was obvious from the behavior of these mosquitoes that the habit is quite normal with them. Confident that the habit, of mosquitoes, of visiting flowers could not have altogether escaped observation I made a hasty canvas of the available literature and brought together the following records of a more definite character.

Theobald states: "I have frequently seen Culicidæ settled on Compositæ, sucking the juices of the flowers, both males and females."* According to Giles "they are frequently found on flowers, and especially in England on the catkins of the willow."† Ficalbi found the first male of his *Culex albopunctatus* upon a flower, sucking the honey, and upon searching the woods he found numbers of the males thus engaged upon flowers of the same kind.‡ A number of records were traced through Knuth's Handbuch der Blütenbiologie. Hermann Müller has observed the male of *Culex pipiens* sucking on the flowers of *Rhamnus frangula*.§ He has observed, in his room, this same species of mosquito effecting the fertilization of *Lopezia coronata* by releasing the pollen and transmitting it to the stigma of an older flower.|| Burkill in observations on the flower-visitors of *Mentha aquatica*, made at Scarborough between September 20 and October 7, found an *Anopheles* species "four times, seemingly sucking honey."** The sex is not indicated.

* Theobald, F. V. : Monogr. Culicidæ, Vol. I, 1901, p. 69.

† Giles, G. M. : Handbook of Gnats or Mosquitoes, 2 ed., 1902, p. 114.

‡ Ficalbi, E. : Venti specie di zanzare (Culicidæ) italiane. Bull. Soc. Ent. Ital., Vol. XXXI, 1899, pp. 107, 186.

§ Müller, H. : Die Befruchtung der Blumen durch Insekten, 1873, p. 153.

|| *L. c.*, p. 198.

** Willis, J. C. & I. H. Burkill : Flowers and Insects in Great Britain, Pt. I, Annals of Botany, Vol. IX, 1895, p. 256.

The foregoing records are all European. Several American observers have noted mosquitoes on flowers. Robertson, in a list of insects found on the flowers of *Ceanothus americanus* between June 19 and 29 includes an undetermined species of Culicidæ.* Smith has found the males of *Aedes sollicitans* "in great numbers in wild cherry blossoms in the early evening, apparently busied in getting at the nectar. Females have been observed at the same time; but apparently these abandoned the vegetable food readily, when the animal odor advised them of something more to their taste." † Dr. Graenicher lists *Aedes stimulans* among the flower-visitors of *Smilax herbacea* and *Smilax hispida*. § No further data are given and upon inquiry Dr. Graenicher informed me that he has no notes which would supply details regarding these observations. However he has very kindly furnished me the following interesting observations upon *Aedes sylvestris*, recently made by him, which I give verbatim.

"At the beginning of August, while collecting the visitors of our earliest species of goldenrod, *Solidago juncea*, I came across a species of *Culex* on two different occasions. Before writing to you on this subject I preferred to follow up the matter more closely. Last Sunday [Sept. 1] the opportunity presented itself, and I found *Culex sylvestris* Theo. (determined by Mr. C. T. Brues, Public Museum of Milwaukee) on the flowers of the following three species of *Solidago*: *juncea* Ait., *canadensis* L., and *lanceolata* L. (*Euthamia graminifolia* (L.) Nutt. in Britton's Manual). This species of *Culex* is common in our region, and it was well represented on the flowers throughout the afternoon, but especially towards evening. Males and females were present, both eagerly sucking nectar. By approaching them cautiously I was able to observe their actions very distinctly with the aid of a lens. During the earlier part of the afternoon the females (which by some are supposed to partake of animal juices only) were present in greater numbers than the males, but later on both sexes were about equally represented."

My own observations were made last spring upon *Aedes spenceri*

* Robertson, Ch. : Flowers and insects, III. Bot. Gazette, Vol. XIV, 1889, p. 304.

† Howard, L. O. : Mosquitoes, 1902, p. 36, and Smith, J. B. : Report, mosquitoes of N. J., 1904, pp. 27, 203.

‡ Graenicher, S. : Flowers adapted to flesh-flies. Bull. Wisc. Nat. Hist. Soc., Vol. I, no. 1, 1902, pp. 33, 34.

Theo. during my stay in Saskatchewan. I shall give some particulars of the life history of this species as they throw some light on its feeding habits. This species develops in immense numbers from the numerous ditches and temporary pools of snow-water scattered over the prairie. The females are voracious blood-suckers and in the early part of the summer make life on the prairie a torture for man and beast. The species is strictly diurnal. The season was an unusually late one this year and the first mosquitoes were seen flying on May 30. The first males were seen swarming on June 5. After several cold, damp days the mosquitoes were again active on June 9, the females biting, the males swarming. The following day there was a very high wind which confined the mosquitoes to their retreats in the grass. June 11 was a hot day with only light wind. On an excursion into the prairie, early in the afternoon, the female mosquitoes were found much fewer in number, perhaps as a result of the great heat. No males were seen swarming, as had been the case on previous favorable days. However, upon examining the willow bushes along the margins of ponds and ditches the males were found in numbers upon the willow catkins. Often there were five or six on one catkin, confining themselves to that part of it which was in full bloom. They climbed about on the stamens and probed down amongst them to get the honey. They appeared very eager in this work, plunging the proboscis down for a second then quickly withdrawing it to reinsert it in another place, sometimes even scrambling over each other in their eagerness. The palpi, together with the antennæ, are held erect nearly at right angles to the proboscis. There were also a few females at the willow catkins, feeding in the same manner as the males but less eagerly. The following day, June 12, was warm but very windy. Along the river bank the mosquitoes were again found abundant upon the willow blooms, and this in spite of the high wind which must have made it very difficult for them to maintain their position. As before, most of the mosquitoes on the catkins were males. Although there was an abundance of flowers of various kinds on the prairie at this time none of these were visited by the mosquitoes. A period of continuous violent wind followed. When this had subsided the mosquitoes were again investigated on June 18. The males had now nearly all disappeared; there were none upon the willow catkins and only a very few could be obtained by beating.

Several points are brought out by these data. The life of the male mosquito does not, at the most, extend over more than two weeks. The males do not appear to take food until after the period of swarming or copulation, nor, in spite of the food taken, do they survive long after the mating period. The females probably only resort to flowers when very hungry and blood is not obtainable. It should be borne in mind that these deductions apply in particular to *Aedes spenceri*. Now that we are more familiar with the habits of individual species of mosquitoes it is obvious that no statements which apply generally can be made from observations on the habits of one species. Thus, according to Dr. Graenicher's observations, the females of *Aedes sylvestris* visit flowers in equal numbers with the males. This species, although a well-known blood-sucker, is not so aggressive and persistent in its quest for blood as *Aedes spenceri*. Moreover it is crepuscular in habit and therefore most abundant on the flowers in the evening, while *Aedes spenceri* frequents them during the day. *Aedes sollicitans*, both sexes of which have been observed by Smith upon flowers, is noted as a most persistent blood-sucker. In fact in all the species recorded in the foregoing as flower visitors the females suck blood. In these hæmatophagous females the nectar of flowers may be considered as a supplementary food which prevents starvation when blood is not available. With the males nectar appears to be the natural food. It is hardly to be supposed that species of mosquitoes limit themselves to particular flowers nor is there any structural modification that would indicate adaptation to certain flowers, such as exists, for example, in the flower-visiting Hymenoptera. The great diversity of flowers visited by mosquitoes bears this out. With the mosquitoes it is probably merely a question of easy accessibility of the nectar and also of the season in which a particular species of mosquito makes its appearance. As the appearance of many species of mosquitoes is regulated by conditions of rainfall which vary from year to year, the flowers available to a given species cannot always be the same.

There are a considerable number of species of mosquitoes which do not suck blood at all and of the feeding habits of these we know nothing. Such are a few of our common species. The little pitcher-plant mosquito, *Wyeomyia smithii* Coq., does not suck blood. Neither does *Culex territans* Walk., a very common species throughout the summer in eastern North America. *Culex melanurus* Coq. apparently does not bite. These species probably obtain nourishment from plants

in some form or other. Observations on the habits of such species are yet to be made.

In conclusion I wish to place on record an observation on *Megarhinus septentrionalis* D. & K., our largest mosquito. On July 14 of this year I found a female of this species at Glen Carlyn, Va., probing for honey upon a cyme of *Hydrangea arborescens* L. The mosquitoes of the genus *Megarhinus* are so rare that very little is known of their habits, but it appears quite certain that they do not attack animals, indeed, their proboscis is unfit for piercing the skin. Probably they feed wholly upon the nectar of flowers, but as they are very rare, even in their proper home—the tropics, and withal very shy, it is not strange that they have escaped observation.

Class I, HEXAPODA.

Order V, LEPIDOPTERA.

THE LIFE HISTORIES OF THE NEW YORK SLUG-CATERPILLARS. — XIX.

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The series of papers under this title ceased in 1899 with the description of *Natada nasoni* Grt., and a concluding general account was given. I am now enabled to add another life history of a species found in New York state, at least occasionally, as Mr. Joutel has taken the larvæ on Staten Island.

Isochaetes beutenmuelleri Hy. Edw.

- 1887 — *Limacodes beutenmuelleri* HY. EDWARDS, Can. Ent., xix, 145.
 1892 — *Semyra beutenmuelleri* KIRBY, Cat. Lep. Het., i, 534.
 1894 — *Semyra beutenmuelleri* NEUMOEGEN & DYAR, Journ. N. Y. Ent. Soc., ii, 71.
 1895 — *Phobetron beutenmuelleri* DYAR, Can. Ent., xxvii, 245.
 1899 — *Isochaetes beutenmuelleri* DYAR, Journ. N. Y. Ent. Soc., vii, 208.
 1902 — *Isochaetes beutenmuelleri* DYAR, Bull. 52, U. S. Nat. Mus., 356, no. 4090.
 1905 — *Isochaetes beutenmuelleri* DYAR, Proc. U. S. Nat. Mus., xxix, 387.

LARVA.

- 1878 — GLOVER, Ill. No. Am. Ent., pl. 11, fig. 1; pl. 20, fig. 40 (no name).
 1899 — DYAR, Proc. Ent. Soc. Wash., iv, 300 (larva no. 2).
 1899 — DYAR, Journ. N. Y. Ent. Soc., vii, 209, 236.
 1902 — JOUTEL, Journ. N. Y. Ent. Soc., ix, 190.